

In the Claims:

Claims 1-50 were previously pending.

Claims 21 and 31 are amended.

Claims 51-53 are added.

Claims 1-53 are pending.

Listing of Claims:

1. (Previously presented) A method of controlling memory usage in a computer system having limited physical memory, wherein one or more application programs execute in conjunction with an operating system, the method comprising:

setting a plurality of memory thresholds; and

the operating system wielding, at increasingly critical memory thresholds, correspondingly increasing control over said one or more application programs to reduce memory usage.

2. (Previously presented) A method as recited in claim 1, wherein the wielding increasing operating system control comprises:

at a less critical memory threshold, communicating a request to at least one of the application programs for the at least one application program to limit its use of memory; and

at a more critical memory threshold, terminating at least one of the application programs without allowing its further execution.

3. (Previously presented) A method as recited in claim 1, wherein the wielding increasing operating system control comprises:

prompting a user to select at least one of the application programs and then the operating system requesting that the at least one selected application program close itself.

4. (Previously presented) A method as recited in claim 1, wherein the wielding increasing operating system control comprises:

prompting a user to select at least one of the application programs and then terminating it without allowing its further execution.

5. (Previously presented) A method as recited in claim 1, wherein the wielding increasing operating system control comprises:

at a first memory threshold, requesting at least one of the application programs to limit its use of memory;

at a second memory threshold, requesting at least one of the application programs to close itself; and

at a third memory threshold, terminating at least one of the application programs without allowing its further execution.

6. (Previously presented) A method as recited in claim 1, wherein the wielding increasing operating system control comprises:

at a first memory threshold, requesting at least one of the application programs to limit its use of memory;

at a second memory threshold, prompting a user to select at least one of the application programs and then requesting it to close itself; and

at a third memory threshold, prompting the user to select at least one of the application programs and then terminating it without allowing its further execution.

7. (Previously presented) A method as recited in claim 1, further comprising:

at one or more of the memory thresholds, reclaiming unused stack memory.

8. (Previously presented) A method as recited in claim 1, further comprising:

at one or more of the memory thresholds, discarding read-only memory.

9. (Previously presented) A computer-readable storage medium having computer-executable instructions for performing the method recited in claim 1.

10. (Previously presented) A computer-readable storage medium having instructions for controlling memory usage in a computer system having limited physical memory, wherein one or more application programs execute in conjunction with an operating system, the instructions being executable by the computer system to perform acts comprising:

at a first memory usage threshold, requesting at least one of the application programs to close itself; and

at a second memory usage threshold that is more critical than the first memory usage threshold, terminating at least one of the application programs without allowing its further execution.

11. (Previously presented) A computer-readable storage medium as recited in claim 10, the instructions being executable to perform additional acts comprising:

before performing the requesting step, prompting a user to select one of the application programs to be closed; and

before performing the terminating step, prompting the user to select one of the application programs to be terminated.

12. (Previously presented) A computer-readable storage medium as recited in claim 10, the instructions being executable to perform additional acts comprising:

before performing the requesting step, requiring a user to select one of the application programs to be closed; and

before performing the terminating step, requiring the user to select one of the application programs to be terminated.

13. (Previously presented) A computer-readable storage medium as recited in claim 10, the instructions being executable to perform an additional act comprising:

at a further memory threshold that is less critical than the first and second memory usage thresholds, requesting at least one of the application programs to limit its use of memory.

14. (Previously presented) A computer-readable storage medium as recited in claim 10, the instructions being executable to perform an additional act comprising:

reclaiming unused stack memory before requesting at least one of the application programs to close itself and before terminating at least one of the application programs.

15. (Previously presented) A computer-readable storage medium as recited in claim 10, the instructions being executable to perform an additional act comprising:

discarding read-only memory before requesting at least one of the application programs to close itself and before terminating at least one of the application programs.

16. (Previously presented) A computer-readable storage medium as recited in claim 10, the instructions being executable to perform additional acts comprising:

reclaiming unused stack memory and discarding read-only memory before requesting at least one of the application programs to close itself and before terminating at least one of the application programs.

17. (Previously presented) A method of controlling memory usage in a computer system having limited physical memory, wherein one or more application programs execute in conjunction with an operating system, the method comprising:

at a first memory usage threshold, requesting at least one of the application programs to limit its use of memory;

at a second memory usage threshold that is more critical than the first memory usage threshold, requesting at least one of the application programs to close itself;

at a third memory usage threshold that is more critical than the first and second memory usage thresholds, terminating at least one of the application programs without allowing its further execution; and

reclaiming unused stack memory and discarding read-only memory before requesting at least one of the application programs to close itself and before terminating at least one of the application programs.

18. (Previously presented) A method as recited in claim 17, wherein the reclaiming and discarding are performed at further memory usage thresholds that are set in relation to the second and third memory usage thresholds.

19. (Previously presented) A method as recited in claim 17, wherein the reclaiming and discarding are performed at further memory usage thresholds that are set in relation to the first, second, and third memory usage thresholds.

20. (Previously presented) A method of controlling memory usage in a computer system having limited physical memory, wherein one or more application programs execute in conjunction with an operating system, the method comprising:

at a first memory usage threshold, requesting at least one of the application programs to limit its use of memory;

at a second memory usage threshold that is more critical than the first memory usage threshold, requesting at least one of the application programs to close itself;

at a third memory usage threshold that is more critical than the first and second memory usage thresholds, terminating at least one of the application programs without allowing its further execution; and

reclaiming unused stack memory and discarding read-only memory before requesting at least one of the application programs to close itself and before terminating at least one of the application programs, further comprising:

before performing the requesting that at least one of the application programs close itself, prompting a user to select one of the application programs to be closed; and

before performing the terminating, prompting the user to select one of the application programs to be terminated.

21. (Presently amended) A method of controlling memory usage in a computer system having limited physical memory, wherein one or more

application programs execute in conjunction with an operating system, the method comprising:

at a first memory usage threshold, requesting at least one of the application programs to limit its use of memory;

at a second memory usage threshold that is more critical than the first memory usage threshold, requesting at least one of the application programs to close itself;

at a third memory usage threshold that is more critical than the first and second memory usage thresholds, terminating at least one of the application programs without allowing its further execution; and

reclaiming unused stack memory and discarding read-only memory before requesting at least one of the application programs to close itself and before terminating at least one of the application programs;

before performing the requesting that at least one of the application programs close itself, requiring a user to select one of the application programs to be closed; and

before performing the terminating, requiring the user to select one of the application programs to be terminated.

22. (Previously presented) A computer-readable storage medium having computer-executable instructions for performing the method recited in claim 17.

23. (Previously presented) A computer system comprising:

a processor;

an operating system that is executable by the processor and that utilizes the physical memory;

a virtual memory system that includes physical memory but does not include secondary storage;

one or more application programs that utilize the virtual memory system;

wherein the operating system is configured to perform the following acts:

monitoring physical memory usage; and

at increasingly critical physical memory usage thresholds, wielding increasing control over said one or more application programs to reduce physical memory usage.

24. (Previously presented) A computer system as recited in claim 23, wherein the act of wielding increasing control comprises the following acts:

at a less critical memory threshold, communicating a request to at least one of the application programs for the at least one application program to limit its use of memory; and

at a more critical memory threshold, terminating at least one of the application programs without allowing its further execution.

25. (Previously presented) A computer system as recited in claim 23, wherein the act of wielding increasing control comprises the following act:

prompting a user to select at least one of the application programs and then the operating system requesting that the at least one selected application program close itself.

26. (Previously presented) A computer system as recited in claim 23, wherein the act of wielding increasing control comprises the following act:

prompting a user to select at least one of the application programs and then terminating it without allowing its further execution.

27. (Previously presented) A computer system as recited in claim 23, wherein the act of wielding increasing control comprises the following acts :

at a first memory threshold, requesting at least one of the application programs to limit its use of memory;

at a second memory threshold, requesting at least one of the application programs to close itself; and

at a third memory threshold, terminating at least one of the application programs without allowing its further execution.

28. (Previously presented) A computer system as recited in claim 23, wherein the act of wielding increasing control comprises the following acts:

at a first memory threshold, requesting at least one of the application programs to limit its use of memory;

at a second memory threshold, prompting a user to select at least one of the application programs and then requesting it to close itself; and

at a third memory threshold, prompting the user to select at least one of the application programs and then terminating it without allowing its further execution.

29. (Previously presented) A computer system as recited in claim 23, wherein the operating system is further configured to perform the following additional act:

at one or more of the memory thresholds, reclaiming unused stack memory.

30. (Previously presented) A computer system as recited in claim 23, wherein the operating system is further configured to perform the following additional act:

at one or more of the memory thresholds, discarding read-only memory.

31. (Presently amended) A computer system comprising:

a processor;

an operating system that is executable by the processor and that utilizes a the physical memory;

a virtual memory system that includes physical memory but does not include secondary storage;

one or more application programs that utilize the virtual memory system;

wherein the operating system is configured to perform the following acts:

monitoring physical memory usage; and

at increasingly critical physical memory usage thresholds, wielding increasing control over said one or more application programs to reduce physical memory usage, wherein the act of wielding increasing control comprises the following acts:

at a first memory threshold, requesting at least one of the application programs to limit its use of memory;

at a second memory threshold, prompting a user to select at least one of the application programs and then requesting that the at least one selected application program close itself;

at a third memory threshold, prompting the user to select at least one of the application programs and then terminating it without allowing its further execution; and

before prompting the user at the second memory threshold, reclaiming unused stack memory and discarding read-only memory.

32. (Previously presented) A method of controlling memory usage in a computer system having limited physical memory, wherein one or more application programs execute in conjunction with an operating system, the method comprising:

monitoring memory usage; and

when memory usage is high, sending a message from the operating system to at least one of the application programs requesting the application program to reduce its current use of memory.

33. (Previously presented) A method as recited in claim 32, further comprising sending the message to the application program when memory usage reaches a defined threshold.

34. (Previously presented) A method as recited in claim 32, wherein the application programs have respective message loops, the method further comprising sending the message to the application program through its message loop.

35. (Previously presented) A method as recited in claim 32, wherein the application programs have respective message loops, the method further comprising sending the message to a particular application program that was least recently active.

36. (Previously presented) A computer-readable storage medium having computer-executable instructions for performing the method recited in claim 32.

37. (Previously presented) A computer-readable storage medium having instructions for controlling memory usage in a computer system having limited physical memory, wherein one or more application programs execute in conjunction with an operating system, the instructions being executable by the computer system to perform acts comprising:

monitoring memory usage; and

at a defined memory usage threshold, sending a message from the operating system to at least one of the application programs requesting the application program to reduce its current use of memory.

38. (Previously presented) A computer-readable storage medium as recited in claim 37, wherein the application programs have respective message loops, the instructions being executable to perform a further act of sending the message to the application program through its message loop.

39. (Previously presented) A computer-readable storage medium as recited in claim 37, wherein the application programs have respective message loops, the instructions being executable to perform a further act of sending the message to a particular application program that was least recently active.

40. (Previously presented) An application program that resides in a computer-readable memory for execution by a processor in conjunction with an operating system, the application program having a message loop that receives messages from an operating system, the application program being responsive to a particular message received through its message loop to reduce its current use of memory.

41. (Previously presented) A computer-readable storage medium having computer-executable instructions embodied therein, that, when executed by a processor, cause the processor to execute a process for controlling memory usage in a computer system having limited physical memory, wherein one or more application programs execute in conjunction with an operating system, the instructions being configured to cause the processor to:

set a plurality of memory thresholds; and

increase control over the one or more application programs by the operating system to reduce memory usage at increasingly critical memory thresholds, the instructions configured to cause the processor to increase control including instructions to cause the processor to request at least one of the application programs to limit its use of memory at a first memory threshold.

42. (Previously presented) The computer-readable storage medium of claim 41, wherein the instructions configured to cause the processor to increase control further comprise instructions configured to cause the processor to:

communicate a request to at least one of the application programs for the at least one application program to limit its use of memory at a less critical memory threshold; and

terminate at least one of the application programs without allowing its further execution at a more critical memory threshold.

43. (Previously presented) The computer-readable storage medium of claim 41, wherein the instructions configured to cause the processor to increase control further comprise instructions configured to cause the processor to prompt a user to select at least one of the application programs and then cause the operating system to request that the at least one selected application program close itself.

44. (Previously presented) The computer-readable storage medium of claim 41, wherein the instructions configured to cause the processor to increase control further comprise instructions configured to cause the processor to prompt a

user to select at least one of the application programs and then terminate it without allowing its further execution.

45. (Previously presented) The computer-readable storage medium of claim 41, wherein the instructions configured to cause the processor to increase control further comprise instructions configured to cause the processor to:

request at least one of the application programs to close itself at a second memory threshold; and

terminate at least one of the application programs without allowing its further execution at a third memory threshold.

46. (Previously presented) The computer-readable storage medium of claim 41, wherein the instructions configured to cause the processor to increase control further comprise instructions configured to cause the processor to:

prompt a user to select at least one of the application programs and then requesting it to close itself at a second memory threshold; and

prompt the user to select at least one of the application programs and then terminating it without allowing its further execution at a third memory threshold.

47. (Previously presented) The computer-readable storage medium of claim 41, further comprising instructions configured to cause the processor to reclaim unused stack memory at one or more of the memory thresholds.

48. (Previously presented) The computer-readable storage medium of claim 41, further comprising instructions configured to cause the processor to discard read-only memory at one or more of the memory thresholds.

49. (Previously presented) A computer-readable storage medium having computer-executable instructions for performing a process for controlling memory usage in a computer system having limited physical memory, wherein one or more application programs execute in conjunction with an operating system, the process comprising:

at a first memory usage threshold, requesting at least one of the application programs to limit its use of memory;

at a second memory usage threshold that is more critical than the first memory usage threshold, requesting at least one of the application programs to close itself;

at a third memory usage threshold that is more critical than the first and second memory usage thresholds, terminating at least one of the application programs without allowing its further execution, and, before performing the terminating, prompting the user to select a currently executing application program to be terminated; and

reclaiming unused stack memory and discarding read-only memory before requesting at least one of the application programs to close itself and before terminating at least one of the application programs.

50. (Previously presented) A computer-readable storage medium having computer-executable instructions for performing a process for controlling memory usage in a computer system having limited physical memory, wherein one or more application programs execute in conjunction with an operating system, the process comprising:

monitoring memory usage; and

when memory usage is high, sending a message from the operating system to at least one of the application programs including a particular application program that was least recently active, requesting the application program to reduce its current use of memory.

New Claims

51. (New) An article of manufacture comprising a computer-readable medium including computer-executable instructions thereon that are configured, when executed electronically, to cause a computer system to perform acts of:

controlling memory usage in a computer system having limited physical memory, wherein one or more application programs execute in conjunction with an operating system by requesting, at a first memory usage threshold, at least one of the application programs to limit its use of memory;

requesting, at a second memory usage threshold that is more critical than the first memory usage threshold, at least one of the application programs to close itself;

terminating, at a third memory usage threshold that is more critical than the first and second memory usage thresholds, at least one of the application programs without allowing its further execution;

reclaiming unused stack memory and discarding read-only memory before requesting at least one of the application programs to close itself and before terminating at least one of the application programs;

prompting a user to select one of the application programs to be closed before performing the requesting that at least one of the application programs close itself; and

prompting the user to select one of the application programs to be terminated, before performing the terminating.

52. (New) An article of manufacture comprising a computer-readable medium including computer-executable instructions thereon that are configured, when executed electronically, to cause a computer system to perform acts of:

first determining that a first memory threshold has been achieved;

requesting at least one of the application programs to limit its use of memory responsive to first determining;

second determining that a second memory usage threshold that is more critical than the first memory usage threshold has been achieved;

requesting at least one of the application programs to close itself responsive to second determining;

third determining that a third memory usage threshold that is more critical than the first and second memory usage thresholds has been achieved;

terminating at least one of the application programs without allowing its further execution responsive to third determining;

reclaiming unused stack memory and discarding read-only memory before requesting at least one of the application programs to close itself and before terminating at least one of the application programs;

requiring a user to select one of the application programs to be closed before requesting that at least one of the application programs close itself; and

requiring the user to select one of the application programs to be terminated before terminating.

53. (New) An article of manufacture comprising a computer-readable medium including computer-executable instructions thereon that are configured, when executed electronically, to cause a computer system to perform acts of:

executing one or more application programs that utilize a virtual memory system that includes physical memory but does not include secondary storage;

executing an operating system that utilizes the physical memory, wherein the operating system is configured to perform acts of:

monitoring physical memory usage; and

wielding increasing control over said one or more application programs at increasingly critical physical memory usage thresholds to reduce physical memory usage, wherein wielding comprises acts of:

requesting at least one of the application programs to limit its use of memory at a first memory threshold;

prompting a user to select at least one of the application programs and then requesting that the at least one selected application program close itself at a second memory threshold;

prompting the user to select at least one of the application programs and then terminating it without allowing its further execution at a third memory threshold; and

before prompting the user at the second memory threshold, reclaiming unused stack memory and discarding read-only memory.